

CLAIMS

1. A metal halide lamp comprising an arc tube that includes:

a translucent ceramic envelop having a central tube having
5 an inner diameter of 5.5 mm or more and two thin tubes
respectively connected to each end of the central tube via
joining portions, and enclosing therein at least a rare earth
halide; and

electrode inductors, each of which (1) has an electrode
10 formed at a tip end thereof, (2) is inserted into one of the
thin tubes with a clearance gap provided between the electrode
inductor and the thin tube so that the electrode is disposed
in a space surrounded by the central tube and the joining
portions, and (3) is sealed in the thin tube at an end thereof
15 opposite a central tube side, wherein

in a cross section of the envelope along a plane including
an axis in a longitudinal direction of the arc tube, an angle
 α formed by each straight-line section of an inner surface of
the central tube and a straight-line section of an inner surface
20 of a respective one of the joining portions is in a range of
85° to 115°, and

a curvature radius of an inner surface of each boundary
region between the central tube and the joining portions is in
a range of 0.5 mm to 2.5 mm.

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2. A metal halide lamp comprising an arc tube that includes:

a translucent ceramic envelop including a central tube
having an inner diameter of 5.5 mm or more and two thin tubes

respectively positioned on each end of the central tube via joining portions, and enclosing therein at least a rare earth halide; and

electrode inductors, each of which (1) has an electrode
5 formed at a tip end thereof, (2) is inserted into one of the thin tubes with a (clearance) gap provided between the electrode inductor and the thin tube so that the electrode is disposed in a space surrounded by the central tube and the joining portions, and (3) is sealed in the thin tube at an end thereof
10 opposite a central tube side, wherein

in a cross section of the envelope along a plane including an axis in a longitudinal direction of the arc tube, an angle α formed by each straight-line section of an inner surface of the central tube and a straight-line section of an inner surface
15 of a respective one of the joining portions is in a range of 85° to 115° , and

a taper section is formed on an inner surface of each boundary region between the central tube and the joining portions, and in the cross section, a length of line segment
20 AC and a length of line segment BC are respectively in a range of 0.5 mm to 2.5 mm when a boundary point between the inner surface of the central tube and the taper section is a point A, a boundary point between the inner surface of the respective one of the joining portions and the taper section is a point B, and an
25 intersecting point of a straight line extending from the straight-line section of the inner surface of the central tube with a line extending perpendicularly from the point B toward the straight line is a point C.

3. The metal halide lamp of one of Claims 1 and 2, wherein
an alkaline earth metal halide is enclosed in the envelope.

5 4. The metal halide lamp of one of Claims 1 and 2, wherein
when a projection length of the electrode is E (mm) and
a minimum wall thickness of each boundary region between the
joining portions and the thin tubes is t_b (mm), each value for
the projection length E and the minimum wall thickness t_b is
10 found within an area defined by lines connecting four points
of $(E, t_b) = (0.5, 1.0), (0.5, 3.5), (5.0, 3.5),$ and $(5.0, 0.5)$.

5. The metal halide lamp of one of Claims 1 and 2, wherein
the envelope is fabricated by integrally forming the
15 central tube, the joining portions, and the thin tubes.

6. A metal halide lamp comprising an arc tube including an
envelope which is a translucent ceramic tube having a main tube
in a center thereof and a pair of thin tubes on each side of
20 the main tube, a light emitting material being enclosed in the
envelope, wherein

the light emitting material contains at least one rare
earth metal halide selected from the group consisting of thulium
(Tm), holmium (Ho) and dysprosium (Dy) along with a calcium
25 halide having a composition ratio in a range of 5 mole % to 65
mole % to all metal halides enclosed in the envelope, and

$p/36 \leq t_n < 1.5$ is satisfied, where t_n is a wall thickness
(mm) of each thin tube and p is a bulb wall loading (W/cm^2) at

time when the metal halide lamp is lit.

7. The metal halide lamp of Claim 6, wherein

a rounded-off portion having a curvature radius in a range
5 of 0.5 mm to 3.0 mm is formed at a corner of each boundary between
the main tube and the thin tubes, facing a discharge space.

8. The metal halide lamp of Claim 6, wherein

a corner of each boundary between the main tube and the
10 thin tubes, facing a discharge space, is processed to form a
chamfer having respective dimensions in a direction parallel
to an axis of the envelope and in a direction perpendicular to
the axis in a range of 0.5 mm to 3.0 mm.

15 9. The metal halide lamp of one of Claims, 6, 7 and 8, wherein

the light emitting material further contains at least one
metal halide selected from the group consisting of cerium
halides and praseodymium halides, having a composition ratio
in a range of 0.5 mole % to 10 mole % to all metal halides enclosed
20 in the envelope.

10. The metal halide lamp of Claim 6, wherein

the envelope is fabricated by integrally forming the main
tube and the thin tubes.

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11. A luminaire comprising:

a metal halide lamp recited in one of Claims 1, 2 and 6;

a light fitting housing the metal halide lamp; and

a lighting circuit for lighting the metal halide lamp.